# CURRICULUM, PEDAGOGY AND BEYOND









#### Planning for Sequences of Challenging Tasks Using the HITS

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#### Acknowledgement of Country

#### **Pocket Money Challenge**

Bob's Dad is one of those Dads who makes their children work for their pocket money, and he has a delightful challenge today. He says:

"Son, I have a challenge for you. Pick any number from 1-100. I will roll a 6-sided dice and count by that number - if it is a 1 I will re-roll the dice. If I land on your number, I will give you \$10."

What are some good numbers that Bob should pick and why should he pick them? Bob's Dad even gives him a 100 chart to help him.





## **Aims for today**

- 1. What a high-quality sequence of challenging tasks looks like
- 2. How we plan sequences of challenging tasks from an initial rich task that cater to the High Impact Teaching Strategies
- 3. The importance of sequencing challenging tasks for students to connect learning and strategies in different contexts

#### **Planning Protocol**

- Choose rich task
- Anticipate student misconceptions and strategies for teacher responses
- Plan for enabling and extending
- Decide on explicit teaching foci
- Allows for sequencing of rich tasks to consolidate the learning
- Flexible time allowed for each lesson
- Purposeful warm-ups





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Worked Examples	Examples of intended learning focus in context - definitions, examples, solutions
Explicit Teaching	Focus straight from curriculum documents + Ss point of need
Metacognitive Strategies	Connecting learning and thinking across activities
Multiple Exposures	Consolidating tasks from rich, reliable sources
Effective Feedback	Feedback to students according to explicit teaching focus
Setting Goals	Proficiencies and Progression of strategies discussed link to learning focus
Good Questions	Planned, purposeful questions & prompts
Structured Lessons	Familiar and predictable lesson structure
DIfferentiated personalised Learning Pasts	Enabling + Extending prompts specific to each lesson
Collaborative Learning	Opportunities for students to explore problems together

#### **Eratosthenes Sieve**

Oceanside Elementary School is preparing for its annual spring carnival. Mr. Johnson has issued a challenge to his fourth-grade students:

If his class can determine the total number of prime numbers on a hundreds chart, he will volunteer to participate in the "Dunk the Teacher" booth at the carnival.

Mr. Johnson suggests that students use the procedure for the Sieve of Eratosthenes as they try to meet his challenge.

HINT: start by shading all the multiples of 2... could colour coding help you?...

#### Successful example + definitions



HITS



#### **Consolidating Tasks**

- → Tasks that are in some way similar and some way different
  - Allows students to make mathematical and problem solving connections between activities
  - Students apply strategies between activities and see their importance
  - Sequences of slightly varied tasks become predictable to students they learn that each one leads to the next
- → Allow the teacher and students to highlight connections between activities every lesson
  - "What is the same and what is different about this problem?"
  - "How might yesterday's problem help you with today's problem?"
  - Allows us to correct misconceptions with a number of examples
  - Gives students multiple opportunities to correct misconceptions

#### **Licorice Factory**

"There's a famous liquorice factory not far from here that produces stretchy liquorice. People come from all over to buy liquorice of different lengths. The factory has dozens of specially numbered machines that can take a unit of liquorice and stretch it out into whatever length the customer wants.

For example, the 4-length machine will stretch a unit length of liquorice out until it is 4 units long."

"The factory was going along really well until, one day, the 6-length machine broke down. Before long, someone came in and asked for some 6-length liquorice."

What could they do?

#### **Licorice Factory**

Someone came up with the idea of putting the unit pieces into the 2-length machine, so the pieces doubled. Then, they took those pieces and put them into the 3-length machine, which turned them into 6-length liquorice."

"The manager of the factory suddenly realised that they may be able to shut a few more machines down and save money. A lifetime's supply of liquorice was offered to the employee who could identify all the machines that could be shut down, while ensuring that all lengths of liquorice from 1 to 100 could still be produced."

'Which machines could be shut down?'

#### Successful example + Definitions



HITS



## **Connecting Tasks**

#### Context

- → With each activity the context changes slightly
- → Engage students in discussion to begin:
  - What is the same? What is different?
  - How could you apply yesterday's strategy/activity?
- → Use a worked example from previous lesson to make learning visible → strategies / definitions / examples

#### **Learning Focus**

- Success develops progressively across the sequence
- → The learning focus is visible from one activity to the next as a bigger picture to work towards
- → Allow multiple exposures to enable and extend learning

#### **Golden Coin**

One day you and a friend wake up to find yourself in a village... in what appears to be medieval times. You are starving and have no food and not a coin in your pocket. Suddenly, an old man approaches you and says, "I will make you a deal. Take a pile of stones and make a rectangle. If you succeed, you can have a gold coin. You can either keep this one coin... or risk losing it by trying to make a new rectangle with the stones and the coin. If you succeed, the same thing will happen. I will award you a gold coin, which you can keep... or try again!"

The old man finishes by saying, "You can choose how many stones to begin with. Any number between 1–100". "Easy", your friend says. "I'll go first. Give me 8 stones."

But your friend got greedy. Instead of just making three rectangles (8, 9, 10) and taking three gold coins, they tried to make a rectangle out of 11... and lost everything! (see Figure 2). Your friend did try 11 in a row, but the old man replied "Long skinny rectangles don't count! Each rectangle needs to have a length and width of at least 2".

It's now your turn.

- How many stones will you ask the old man for to begin with?
- Can you make more than three consecutive rectangles (and earn more than three gold coins)?
- What do you think is the best choice? Why?



## **Aims for today**

- What a high-quality sequence of challenging tasks looks like
  - 4 rich activities for students to investigate ideas around multiples and factors, composite and prime numbers
- How we plan sequences of challenging tasks from an initial rich task that cater to the High Impact Teaching Strategies
  - > Each of the HITS is present in every activity (some in multiple ways)
  - The importance of sequencing challenging tasks for students to connect learning and strategies in different contexts
    - The selection and sequencing of activities allows students to achieve the learning goals at their level
    - Opportunities to build on their thinking through connected activities











## **Event App**

App Download Instructions

Step 1: Download the App 'Arinex One' from the App Store or Google Play



- Step 2: Enter Event Code: mav
- Step 3: Enter the email you registered with
- Step 4: Enter the Passcode you receive via email and click 'Verify'. Please be sure to check your Junk Mail for the email, or see the Registration Desk if you require further assistance.





## Be in it to WIN!

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A02 - (Year 1 to Year 6) Supporting High Potential and Gifted Learners in Mathematics

#### Pedagogy

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(i) Description

R∃ Speaker



Dr Chrissy Monteleone

